UNITED STATES
NUCLEAR REGULATORY COMMISSION
REGION II
SAM NUNN ATLANTA FEDERAL CENTER
61 FORSYTH STREET SW SUITE 23T85
ATLANTA, GEORGIA 30303-8931

[redacted]

October 4, 2004

BWX Technologies, Inc.
ATTN: Mr. W. D. Nash, Vice President
and General Manager
Nuclear Products Division
P. O. Box 785
Lynchburg, VA 24505-0785

SUBJECT: NRC INSPECTION REPORT NO. 70-27/2004-006

Dear Mr. Nash:

This refers to the inspection conducted from July 25 through September 4, 2004, at the Nuclear Products Division facility. The purpose of the inspection was to determine whether activities authorized by the license were conducted safely and in accordance with NRC requirements. At the conclusion of the inspection, the findings were discussed with those members of your staff identified in the enclosed report.

Areas examined during the inspection are identified in the report. Within these areas, the inspection consisted of selective examinations of procedures and representative records, interviews with personnel, and observation of activities in progress.

Based on the results of this inspection, the NRC has determined that a violation of NRC requirements occurred. This violation is being treated as a non-cited violation (NCV), consistent with Section VI.A.8 of the Enforcement Policy. The NCV is described in the subject inspection report. If you contest the violation or significance of this NCV, you should provide a response within 30 days of the date of this inspection report, with the basis for your denial, to the Nuclear Regulatory Commission, ATTN: Document Control Desk, Washington DC 20555-0001, with copies to the Regional Administrator, Region II, and the Director, Office of Enforcement, United States Nuclear Regulatory Commission, Washington, DC 20555-0001, and the NRC Resident Inspector at your facility.

[redacted]

[redacted]

[redacted]

[redacted]

[redacted]

Should you have any questions concerning this letter, please contact us.

Sincerely,

/RA/ By A. Gooden (For)

David A. Ayres, Chief
Fuel Facility Inspection Branch 1
Division of Fuel Facility Inspection

Docket No. 70-27
License No. SNM-42

Enclosures: 1. NRC Inspection Report (Part 1) [redacted]
2. NRC Inspection Report (Part 2) [redacted]

cc w/encls:
Leah R. Morrell
Manager, Licensing and Safety Analysis
BWX Technologies
P. O. Box 785
Lynchburg, VA 24505-0785

Distribution w/encls: (See Page 3)

[redacted]

[redacted]

[redacted]

Distribution w/encls:
D. Ayres, RII
A. Boland, RII
B. Gleaves, NMSS
A. Gooden, RII
J. Lubinski, NMSS
G. Wertz, RII
B. Westreich, NSIR

PUBLIC DOCUMENT (circle one): YES NO

OFFICE	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI	RII:DFFI
SIGNATURE	AG (for)	AG (for)	DA (for)	MC	RG
NAME	GWertz:vyg	AGooden	Classifer	MCrespo	RGibson
DATE	10/01/04	10/01/04	5/ /2008	10/01/04	10/01/04
E-MAIL COPY?	YES	YES	YES NO	NO	YES

OFFICIAL RECORD COPY DOCUMENT NAME: C:\ORPCheckout\FileNET\ML042800276.wpd

[redacted]

[redacted]

[redacted]

U. S. NUCLEAR REGULATORY COMMISSION

REGION II

Docket No.:	70-27
License No.:	SNM-42
Report No.:	70-27/2004-006
Licensee:	BWX Technologies, Inc.
Facility:	Nuclear Products Division
Location:	Lynchburg, Virginia
Dates:	July 25 through September 4, 2004
Inspector:	G. Wertz, Senior Resident Inspector M. Crespo, Fuel Facility Inspector A. Gooden, Senior Fuel Facility Inspector R. Gibson, Health Physics Inspector
Approved by:	David A. Ayres, Chief Fuel Facilities Inspection Branch 1 Division of Fuel Facility Inspection

Enclosure 1

[redacted]

[redacted]

[redacted]

NRC INSPECTION REPORT 70-27/2004-06 (PART 1)

EXECUTIVE SUMMARY

BWX Technologies, Inc., Nuclear Products Division

This inspection included periodic observations conducted by the senior resident inspector during normal and off-normal shifts in the area of facility operations. A specialized inspection and review of documentation were conducted by regional inspectors in the areas of Operations and Training (August 23 through 27), and Radiation Protection and Waste Management (August 30 through September 2). The results of these inspections are included in Part 1 of this report.

Plant Operations

- The facility was operated safely and in accordance with regulatory and license requirements. The Emergency Operations Center and associated equipment were maintained in a state of readiness. Maintenance work was performed in accordance with radiation work permit requirements. Housekeeping was adequate to ensure routes of egress were clear in case of an emergency (Paragraph 2.a).

- Special nuclear material processing operations involving development for [redacted] were performed safely and in accordance with procedural requirements (Paragraph 2.b).

- Nuclear criticality safety control devices and measures were properly implemented (Paragraph 2.c).

- Radiation control technicians appropriately evaluated and resolved criticality monitoring system alarms caused by inadvertent detector failure and electrical storm interference. No loss of criticality monitoring system coverage occurred (Paragraph 2.d).

- Installation and initial operation of the [redacted] was performed in accordance with approved design and safety evaluation requirements. Nuclear criticality safety, radiation protection, and process engineering reviews were thorough and effectively identified the necessary safety controls. The safety analysis report, design drawings, and operating procedure accurately described the new system and safety controls (Paragraph 2.e).

- The licensee adequately implemented and maintained the required safety controls for the downblending and [redacted] systems (Paragraph 2.f).

- The licensee adequately implemented configuration control in Uranium Recovery. Plant activities observed were properly implemented by knowledgeable operators (Paragraph 2.g).

[redacted]

[redacted]

- The operating procedures document control system and operator training provided operators with adequate knowledge of the current operating procedure (Paragraph 2.h).

- The licensee adequately implemented calibration and preventive maintenance for the [redacted] (Paragraph 2.i).

Management Organization and Controls

- Two licensee investigation teams performed a thorough and detailed analyses but could not specifically ascertain the root cause of [redacted]. The corrective actions implemented to enhance the processing operators' awareness and response to any [redacted] anomalies appeared adequate to ensure safe operation (Paragraph 3.a).

- A non-cited violation was identified when failure to follow procedural requirements resulted in a [redacted] fire [redacted]. The fire was promptly extinguished and management notified. The licensee's root cause analysis was comprehensive and identified corrective actions to preclude recurrence (Paragraph 3.b).

- Planned maintenance work disabled a ventilation system which allowed [redacted] accumulation in [redacted] otherwise [redacted]. However, nuclear criticality safety controls had been properly maintained to ensure a criticality accident remained highly unlikely and corrective actions were planned to minimize recurrence (Paragraph 3.c).

Maintenance and Surveillance

- Electrical power distribution work affecting [redacted] systems such as the criticality monitoring system was performed safely [redacted]. The licensee properly diagnosed, planned, and corrected [redacted] while maintaining the safety of plant employees (Paragraph 4.a).

- [redacted] maintained adequate [redacted] boundary wall thickness (Paragraph 4.b).

Radiation Protection

- The exposure control program was implemented in a manner to track and identify undesirable exposure trends for maintaining doses as low as reasonably achievable and less than the regulatory limits. The annual exposure results for an area dosimeter located in the [redacted] was the highest in four years, and more than double the 2002 results (Paragraph 5.a).

[redacted]

[redacted]

- The respiratory protection equipment issuance and user certification program was implemented in accordance with procedures and license requirements (Paragraph 5.b).

- The licensee's postings were based on survey results and provided adequate controls to communicate to workers the potential hazard and/or protective equipment requirements for working in areas (Paragraph 5.c).

- Based on records reviewed and interviews, training and program goals associated with maintaining dose as low as reasonably achievable were implemented in accordance with the license (Paragraph 5.d).

Waste Management

- [redacted] underground radioactive liquid waste tanks at the Lynchburg Technology Center [redacted] were safely removed. Soil sample surveys obtained during the work and following tank removal indicated no radiological contamination was present (Paragraph 6.a).

- The gaseous effluent monitoring program was effective in controlling and measuring effluents, and compliant with the requirements of the license. The effluent air sampling equipment, including the sample delivery lines, had been properly maintained. Calculated offsite doses were below regulatory limits (Paragraph 6.b).

- The liquid effluent program effectively maintained effluent concentrations below the limits specified in the license (Paragraph 6.c).

Radioactive Waste Generator Requirements

- The radioactive waste shipment tracking system records and waste shipment manifests were complete and accurate. The program for the disposal of low-level radioactive waste was compliant with regulatory requirements (Paragraph 7).

Low-level Radioactive Waste Storage

- Low-level radioactive waste was stored in accordance with regulatory requirements. Radioactive material and waste greater than Class C quantity was adequately [redacted] (Paragraph 8).

Training

- The licensee adequately implemented the nuclear criticality safety, general employee, and radiation worker training programs for the facility (Paragraph 9.a).

- The training system used to maintain qualified operators was effective (Paragraph 9.b).

[redacted]

[redacted]

[redacted]

Attachment:
Partial Listing of Persons Contacted
Inspection Procedures Used
List of Items Opened, Closed and Discussed
List of Acronyms

[redacted]

[redacted]

[redacted]

REPORT DETAILS

1. **Summary of Plant Status**

Routine fuel manufacturing operations and maintenance activities were conducted in the [redacted], and other routine operations and maintenance activities were conducted in the [redacted] facility.

2. **Plant Operations (Temporary Instruction (TI) 2600/006 and Inspection Procedure (IP) 88020)**

a. Conduct of Operations - Routine Observations

(1) Inspection Scope and Observations

The inspectors toured the licensee's facilities to observe various operational and work activities. Observed activities were assessed to determine if the facility was operated safely and in accordance with license and regulatory requirements. The inspectors also checked the Emergency Operations Center (EOC) and associated equipment to determine if the facility was maintained in a state of readiness. Housekeeping associated with the storage of equipment and materials throughout the facility was also reviewed for any significant potential hazards. The inspectors performed a routine fire safety tour to verify that fire hazards were minimized especially in locations containing hazardous chemicals or [redacted] nuclear materials.

The inspectors reviewed various operational procedures and records, radiation work permits (RWP), and nuclear criticality safety (NCS) postings, to determine if operations were performed safely and in accordance with approved plant procedures and postings. The inspectors observed that specific operations were performed safely and in accordance with approved plant procedures and postings. Discussions with operations personnel confirmed an understanding of the procedural and posting requirements. The inspectors verified that the EOC and associated equipment were maintained in a state of readiness.

Outside areas were toured and inspected. No conditions that could create an undesirable situation or hazard in the event of adverse weather (high winds, cold weather, or flooding), or blocked evacuation pathways were observed. During tours of the facility, the inspectors noted radiological signs, postings, and procedures were properly posted or readily available. The inspectors observed conditions and determined that equipment and devices used to confine and contain radioactive contamination and airborne radioactivity in [redacted] and other material access areas (MAA) were in proper working condition, and that personal protective clothing and dosimetry were issued and properly worn. During process area tours, the inspectors noted that emergency egress routes were adequately clear of debris.

[redacted]

[redacted]

[redacted]

(2) Conclusions

The facility was operated safely and in accordance with regulatory and license requirements. The EOC and associated equipment were maintained in a state of readiness. Maintenance work was performed in accordance with RWP requirements. Housekeeping was adequate to ensure routes of egress were clear in case of an emergency.

b. Uranium Processing Operations

(1) Inspection Scope and Observations

The inspectors observed uranium processing operations involving development work for [redacted]. The work was performed in accordance with the requirements of operating procedures (OP) 1011207 and 1014625. A [redacted] operated properly. Operators were cognizant of the safety requirements for sampling and handling the special nuclear material (SNM) [redacted]

(2) Conclusions

SNM processing operations involving development work for [redacted] were performed safely and in accordance with procedural requirements.

c. Implementation of Process Safety Controls

(1) Inspection Scope and Observations

The inspectors reviewed nuclear criticality control devices and measures in effect during the inspection period in order to assess the effectiveness of the licensee's program for prevention of an inadvertent criticality. The inspectors toured fuel processing, storage, and recovery areas and observed that personnel complied with approved, written NCS limits and controls, especially in areas where the licensee was using administrative controls rather than passive or active engineering controls. The inspectors verified NCS limits were posted and available to the operators. During tours of [redacted] areas of the facility, the inspectors observed proper spacing practices and controls, use of storage locations, and identification of SNM.

(2) Conclusions

NCS control devices and measures were properly implemented.

[redacted]

[redacted]

[redacted]

d. Criticality Monitoring System Alarms

(1) Inspection Scope and Observations

Criticality Monitoring System (CMS) alarms occurred in [redacted] on July 18 and 23. Radiation control (RC) technicians evaluated the alarms and documented the resolution in the corrective action (CA) system. CA 2004-522 detailed CMS alarm actuation at the [redacted] during an electrical storm. Storm watch provisions were properly invoked for all CMS covered areas. The alarms were properly evaluated and reset in accordance with Radiation Protection (RP) 07-28, Attachment 6, "Inclement Weather Flow Chart." CA 2004494 detailed a CMS detector failure in [redacted]. RC technicians appropriately evaluated the condition in accordance with RP 07-28, Attachment 9, "Response to Criticality Monitor/Detector Failure." The detector was replaced. No loss of CMS coverage occurred.

(2) Conclusions

RC technicians appropriately evaluated and resolved CMS alarms caused by inadvertent detector failure and electrical storm interference. No loss of CMS coverage occurred.

e. [redacted] System and System Review

(1) Inspection Scope and Observations

Initial operation of the [redacted] system commenced in August using [redacted]. The inspectors reviewed the Safety Evaluation Report (SER) authorizing installation of the [redacted], the Safety Analysis Report (SAR) documenting the hazard analysis, the OP, and the applicable process and instrumentation drawings (P&ID). The inspectors observed various installation and testing activities [redacted] and observed initial system operation. The inspectors also observed the training of a newly assigned processing operator.

SER 03-033, "[redacted] System," documented the safety reviews for installation and operation of the system. The inspectors reviewed the NCS requirements with the cognizant NCS engineer. NCS postings appeared effective to ensure adequate NCS administrative controls and were consistent with the results of the supporting analysis: NCS-2003-113. NRC Headquarters NCS inspectors reviewed supporting NCS analyses 2004-062 and 2004-068 (see NRC Inspection Report 70-27/2004-204) which evaluated modifications to the original system design. The inspectors noted that the NCS engineer thoroughly analyzed and effectively designed engineered controls to minimize the potential for human error induced upset conditions [redacted]).

[redacted]

[redacted]

[redacted]. Preoperational testing verified the negative pressure requirements within the enclosures were satisfied. Detailed acceptance tests were performed which verified safety functions [redacted] were operational.

[redacted]," accurately captured the safety conditions resulting from the installation of the [redacted] system. The inspectors observed the initial system operation in accordance with OP-1014952, "[redacted] System" and performed a partial system review in accordance with P&ID's REC 2004-003 and 004. No discrepancies were identified. The inspectors noted that the process engineer exhibited a high level of system knowledge during initial operation and staff training.

(2) Conclusions

Installation and initial operation of the [redacted] was performed in accordance with approved design and safety evaluation requirements. NCS, RP and process engineer reviews were thorough and effectively identified the necessary safety controls. The safety analysis report, design drawings, and operating procedures accurately described the new system and safety controls.

f. Safety Function (O3.02)

(1) Inspection Scope and Observations

The inspectors reviewed and verified that the safety controls for the [redacted] and [redacted] systems were available and consistent with the SAR description. No discrepancies were observed.

(2) Conclusions

The licensee adequately implemented and maintained the required safety controls for the [redacted] systems.

g. Plant Activities (O3.03); Configuration Control (O3.04); and Change Control (O3.05)

(1) Inspection Scope and Observations

The inspector reviewed the configuration and change control process of the [redacted] system and verified the passive engineered safety controls. The inspectors observed operations in the [redacted] areas noting that the areas were clean with clear emergency egress. Operators questioned in these areas were knowledgeable of the safety systems and controls.

[redacted]

[redacted]

[redacted]

Process piping connections between the [redacted] were compared to the process and instrumentation design (P&ID) drawings and no discrepancies were observed.

(2) Conclusions

The licensee adequately implemented configuration control in the uranium recovery area. Plant activities were observed to be properly implemented by knowledgeable operators.

h. Operating Procedures (O3.06)

(1) Inspection Scope and Observations

The inspectors reviewed the operating procedures (OP) for the [redacted] system and the Document Review Tracking System, and verified that the biennial OP reviews were completed. The inspectors observed that operators were adequately trained by the cognizant process engineer which ensured that qualified individuals were performing the training.

(2) Conclusions

The OP document control system and operator training provided operators with adequate knowledge of the current operating procedure.

i. Maintenance of Safety Controls (O3.07)

(1) Inspection Scope and Observations

The inspectors verified proper calibration and monthly preventive maintenance of the in-line radiation monitor used for [redacted]. No discrepancies were identified.

(2) Conclusions

The licensee adequately implemented calibration and preventive maintenance for the [redacted] in-line radiation monitor.

[redacted]

[redacted]

3. **Management Organization and Controls (TI 2600/006)**

a. [redacted] Incident Investigation

(1) Inspection Scope and Observations

On April 15, 2004, a downblending operator noticed a chemical excursion when uranium [redacted] undergoing initial [redacted]." The operator immediately stopped the [redacted] process and notified area supervision. The [redacted] solution, and unprocessed [redacted] for analysis. The event was captured in CA 2004-217. The inspectors reviewed the licensee's root cause analysis in order to assess the effectiveness of the corrective actions.

Two review teams performed thorough reviews of the process and material characteristics which could have caused the chemical reaction. The process review included: [redacted]

[redacted] Operators questioned were cognizant of the changes.

(2) Conclusions

Two licensee investigation teams performed thorough and detailed analyses but could not specifically ascertain the root cause of [redacted] The corrective actions implemented to enhance the processing operators' awareness and response to any [redacted] anomalies appeared adequate to ensure safe operation.

[redacted]

[redacted]

[redacted]

b. [redacted] Fire

(1) Inspection Scope and Observations

On June 12, a fire occurred in [redacted]. The operators acted promptly to extinguish the fire and notify emergency team support and management (CA 2004-420). Management secured [redacted] processing operations pending completion of the root cause investigation and implementation of corrective actions.

The investigation team root cause report accurately evaluated the event [redacted]. The corrective actions were comprehensive and addressed the root cause. Additional controls (pre-job briefings, lessons learned review, and procedure adherence, fire safety and emergency stop function training) were implemented to ensure that operators were cognizant of the [redacted] material processing requirements. The inspectors concluded that the corrective actions were adequate to preclude recurrence of another [redacted] fire event. As such, this non-repetitive, licensee-identified and corrected violation was treated as a non-cited violation (NCV), consistent with Section VI.A.8 of the NRC Enforcement Policy (NCV 70-27/2004-06-01, Failure to Follow Procedure Results in [redacted] Fire).

SAR 15.6, [redacted] SNM mass log indicated a very minor amount of SNM [redacted]. The inspectors observed the [redacted] system with a process engineer. Fire mitigation systems [redacted] were available. No other safety concerns were identified and the inspectors concluded that the safety significance of the [redacted] fire was low.

(2) Conclusions

An NCV was identified following a [redacted] fire resulting from [redacted] in accordance with OP requirements. The operators promptly extinguished the fire. The licensee's root cause analysis was comprehensive and identified corrective actions adequate to preclude recurrence.

[redacted]

[redacted]

[redacted]

c. [redacted]

(1) Inspection Scope and Observations

On July 5, RC technicians identified [redacted] accumulation inside [redacted]. The cause of the [redacted] was due to loss of ventilation when electrical power was isolated during shutdown maintenance work (July 3 through 11). NCS engineering was promptly notified and evaluated the condition. The condensation dissipated within a few minutes of ventilation system restoration. NCS engineers noted that [redacted] in preparation for shutdown maintenance. In addition, the NCS postings allowed [redacted]. As such, the NCS engineer determined that a criticality event remained highly unlikely. Area management and maintenance were notified and planned to modify the ventilation system to minimize future [redacted] events.

(2) Conclusions

Planned maintenance work disabled a ventilation system and allowed [redacted] to accumulate in [redacted]. However, NCS controls had been properly maintained to ensure a criticality accident remained highly unlikely. Corrective actions were planned to minimize recurrence.

4. **Maintenance and Surveillance (TI 2600/006)**

a. Electrical Power Distribution Modification Work

(1) Inspection Scope and Observations

On August 14 and 15, the licensee implemented changes to the electrical power distribution system involving installation of [redacted]. The inspectors reviewed and observed the planned and actual electrical power distribution work focusing on the impact to the facility's [redacted] systems and the [redacted] (see NRC Inspection Report 70-27/2004-006, Part 2 for the [redacted] review).

Reconfiguration of the [redacted] the weekend [redacted] in order to minimize the impact to workers from the implementation of compensatory safety measures. The [redacted] work was not expected to affect the [redacted] and therefore, normal operations were planned [redacted] coverage areas affected by the [redacted] work were isolated for the day. The licensee originally planned to operate the CMS audible alarm "howlers" in manual mode for the day in order to prevent unexpected alarm actuation and evacuation. However, the inspectors reviewed the electrical system with cognizant engineers who indicated the

[redacted]

[redacted]

[redacted]

CMS was protected from the electrical work and an unplanned activation was remote. As such, the RP manager revised the plan to leave the howlers in automatic mode following the [redacted] transfer.

The inspectors noted that the electrical engineers were unable to verify if all the CMS howler control boxes were supplied [redacted]. The licensee reacted appropriately and promptly restored [redacted]. Another plan was formulated which reconfigured the howler control box power supply from the CMS [redacted] The licensee implemented additional compensatory measures during this transition as all employees were relocated to the cafeteria (or had radiation monitoring) during the transfer work.

The [redacted] was performed as planned. [redacted].

(2) Conclusions

Electrical power distribution work affecting [redacted] systems such as the CMS was performed safely on [redacted]. The licensee properly diagnosed, planned and corrected the [redacted] while maintaining the safety of plant employees.

b. Downblending [redacted]

(1) Inspection Scope and Observations

Maintenance work to the UR downblending [redacted] removed surface metal from the [redacted]. Based on the manufacturer's data, the original wall thickness for the [redacted]. The machining reduced the wall thickness to [redacted]. The cognizant process engineer indicated that the minimum wall thickness [redacted]. The inspectors verified the minimum wall thickness by calculation, reviewed the measurement data, and concluded that adequate wall thickness was maintained to support safe operation.

[redacted]

[redacted]

[redacted]

(2) Conclusions

[redacted] maintained adequate [redacted] boundary wall thickness.

5. **Radiation Protection (IP 83822) (R1)**

a. Exposure Control (R1.04 and R1.05)

(1) Inspection Scope and Observations

The inspectors reviewed exposure results to determine if exposures resulting from various plant operations exceeded limits in 10 CFR 20, and discussed with licensee representatives the controls for assessing personnel exposure to verify that the administrative and physical controls were in place to control occupational dose as low as reasonably achievable (ALARA).

Procedures contained administrative action limits, and dose goals were established to maintain exposures less than the occupational limits in 10 CFR 20.1201. The licensee's exposure monitoring program was consistent with regulations and license requirements for monitoring external and internal exposures. The licensee's dosimetry provider was certified by the National Voluntary Laboratory Accreditation Program (NVLAP). Table 1 below displays the maximum assigned exposure data for calendar years (CY) 2002, 2003 and CY 2004 as of July. No regulatory or license limits were exceeded.

Table 1. Annual Exposures

Year		Deep Dose Equivalent (DDE) - rem	Shallow Dose Extremity (SDE) - rem	Total Effective Dose Equivalent (TEDE) - rem	Collective TEDE (person-rem)	Committed Effective Dose Equivalent (CEDE) - rem
2002	NPD	0.439	0.158	0.696	36.41	0.696
	LTC	1.24	3.69	1.24	9.00	0.004
2003	NPD	0.205	0.091	0.572	40.00	0.572
	LTC	1.43	4.84	1.43	8.38	0.000
*2004	NPD	0.000	0.000	0.390	18.76	0.390
	LTC	0.431	1.37	0.431	3.20	0.000

***Note**: Exposure results as of July 2004

[redacted]

[redacted]

[redacted]

The inspectors observed [redacted] entries at the Lynchburg Technology Center (LTC) involving the relocation of [redacted] activity samples and highly contaminated equipment, and determined that the licensee's performance in monitoring exposures and controlling the potential spread of contamination was effective in meeting the project's exposure goals.

Area dosimeter results for the LTC [redacted] were reviewed to determine what the activity level may have been during CY 2003 when compared to previous years. Based on documentation and an interview with LTC health physics personnel, the dosimeter results for CY 2003 was the highest (76.63 rem/year) since CY 99 (70.34 rem/year) and more than two times CY 2002 results (31.44 rem/year). In response to the observation, the licensee indicated that the dosimeter badge was located on the sample storage [redacted] where [redacted] activity samples are stored pending sample return to the customers. The inspectors requested exposure data for the maximally assigned individual working in the [redacted] and determined that no exposure limits had been met or exceeded. During a teleconference call conducted September 9, 2004, the licensee discussed plans by the ALARA Committee to review sample disposition and storage to reduce the area exposure results.

(2) Conclusions

The exposure control program was implemented in a manner to track and identify undesirable exposure trends for maintaining doses as low as reasonably achievable (ALARA) and less than the regulatory limits. The annual exposure results for an area dosimeter located in the [redacted] at the Lynchburg Technology Center was the highest in four years, and more than double the 2002 results.

b. Respiratory Protection (R1.06)

(1) Inspection Scope and Observations

Respiratory protection equipment issuance, maintenance, and training was examined to determine if equipment was being adequately maintained and obtained by certified users only. The inspectors observed personnel at the LTC [redacted] performing maintenance work under a radiation work permit (RWP) which required the use of supplied air respiratory equipment. Based on interviews and documentation for physical fit tests and respiratory protection training, all personnel involved in the LTC maintenance work had current certification and approval to use the supplied air equipment. Medical and radiation protection personnel at NPD assigned the responsibility for fit testing, training, and issuance of respirators were interviewed. The inspectors determined that the fit testing equipment was properly maintained and calibrated, and the exam which was administered following respiratory protection training was sufficient to evaluate the comprehension of information. Several names were selected from the respirator issuance logs and RWPs to verify that user certification was current and appropriate for the type of respirator worn. No problems were noted. The licensee periodically

[redacted]

performed program audits to verify the effectiveness of the respiratory protection program implementation. The last such audit was conducted during August 2004.

(2) Conclusions

The respiratory protection equipment issuance and user certification program was implemented in accordance with procedures and license requirements.

c. Postings, Labeling, and Control (R1.07)

(1) Inspection Scope and Observations

Several work locations were reviewed to assess the adequacy of contamination control barriers and posting of radiation areas as required by 10 CFR 20.1902. Radiation Work Permits (RWP) were reviewed to determine the adequacy of the requirements posted for worker protection and the degree to which those requirements were being implemented. Based on interviews, plant wide survey documentation, and observation of work activity associated with the LTC [redacted] entries, the inspectors determined that areas were properly posted, and access to high radiation areas were secured and maintained under positive controls. All observed work areas involving radioactive material or potentially contaminated material were properly posted and containers were properly labeled. Randomly selected active and closed RWP provided the appropriate level of protection to workers. No problems were noted when the inspectors reviewed site activity at the work location for verification that RWP requirements were being followed by workers.

(2) Conclusions

The licensee's postings were based on survey results and provided adequate controls to communicate to workers the potential hazard and/or protective equipment requirements for working in areas.

d. Implementation of ALARA Program (R1.10)

(1) Inspection Scope and Observations

The ALARA program was reviewed to determine if the program and goals were being developed and implemented in accordance with the license. The inspectors interviewed the health physicist assigned responsibility for the ALARA evaluations and assessments associated with the LTC [redacted] work. In addition, the program for reinforcing ALARA concept among employees was assessed. On a frequent basis the ALARA committee was provided reports detailing the ALARA goals and exposure summaries to identify undesirable trends. As discussed above in Paragraph 5.a of this report, the inspectors discussed with the licensee plans by the ALARA Committee to review sample disposition and storage to reduce the area exposure results for the [redacted] LTC. The inspectors were informed that the goals established for the LTC project was based on

[redacted]

past source term surveys and the resulting exposures. Several workers were interviewed regarding ALARA and demonstrated an adequate knowledge and/or understanding of ALARA concepts. Interviewees indicated that ALARA concepts were reinforced during annual radiation worker training.

(2) Conclusions

Based on records reviewed and interviews, training and program goals associated with maintaining dose as low as reasonably achievable were implemented in accordance with the license.

6. **Waste Management (TI 2600/006 and IP 88035) (R3)**

a. Underground Radioactive Waste Storage Tanks Removal

(1) Inspection Scope and Observations

[redacted] underground liquid waste storage tanks located at the LTC [redacted] were excavated for off-site disposal between August 20 and 24. Work to remove the tanks was performed safely and in accordance with the requirements of LTC OP B-GP-40, "Work Order Program," work order 0400230 and RWP LTC-04-49. Radiological surveys of the tanks' exterior surface and surrounding soil indicated no radioactive contamination was present.

The tank removal project was planned and performed in accordance with the LTC Work Order Program (OP B-GP-40). The applicable safety discipline reviews were performed, including radiation and environmental protection, and industrial safety. Although the LTC decommissioning plan update was not specified in the work order, the cognizant health physicist planned to incorporate the tank removal work. The inspectors also discussed SNM-42, Section 2.5 modification review requirements with the LTC area health physics supervisor who planned to revise OP B-GP-40 to enhance future LTC change review documentation.

(2) Conclusions

[redacted] underground radioactive liquid waste tanks at the Lynchburg Technology Center [redacted] were safely removed. Soil sample surveys taken during the work and following the tank removal indicated no radiological contamination was present.

[redacted]

b. Airborne Effluent Program Controls, Instrumentation, Ventilation, and Airborne Effluent Monitoring Results

(1) Inspection Scope and Observations

The inspectors examined selected stack effluent sampling stations at LTC, and Nuclear Products Division (NPD) to ensure that equipment was maintained and representative samples were being collected. The inspectors reviewed the airborne effluent monitoring results to verify that releases were within license application limits.

The inspectors observed health physicist technicians collect daily air particulate filter samples and impinged samples from several stacks. The stack samples were taken properly by the technicians in accordance with the OP. No significant changes to the procedure or the program were noted since the last inspection. Stainless steel enclosures used to protect the sampling equipment from environmental conditions and polyethylene and stainless steel sample delivery lines were in good condition with no signs of damage or corrosion. Small heaters were used on the sample delivery lines that had experienced condensation problems.

The stack sampling results, which include impinged samples and quantities of airborne radioactive materials released for the second six months of 2003 and 2004 to date, and the semiannual effluent release reports to the NRC for the first six months of 2004 were reviewed. The dose from the gaseous effluent was less than 0.04 millirem per six months, which was consistent with dose reported for the previous year. The calculated offsite doses for gaseous effluents were well below 10 CFR 20 constraint level of 10 millirem per year.

(2) Conclusions

The gaseous effluent monitoring program was effective in controlling and measuring effluents, and compliant with the requirements of the license. The effluent air sampling equipment, including the sample delivery lines, had been properly maintained. Calculated offsite doses were below regulatory limits.

c. Liquid Effluent Monitoring Results

(1) Inspection Scope and Observations

The inspectors reviewed the liquid effluent monitoring data for LTC and NPD, in order to verify that releases were compliant to the limits specified in the license application requirements. The liquid effluent dose was less than 0.3 millirem per six months, which was consistent with doses reported in the previous year and well below the 10 CFR 20 limit of 50 millirem per year. The inspectors concluded that the licensee's liquid effluents monitoring programs were effective in controlling and measuring effluents, and met the requirements of the license.

[redacted]

[redacted]

(2) Conclusions

The liquid effluent program effectively maintained effluent concentrations below the limits specified in the license.

7. **Radioactive Waste Generator Requirements (IP 84850) (R6)**

a. Inspection Scope and Observations

The inspectors reviewed the program for preparing waste shipping manifests, and tracking waste shipments, and verified that the licensee established and maintained adequate management controls of procedures and processes to ensure compliance with the requirements of 10 CFR 20, Appendix G, and 10 CFR 61.55 and 61.56.

Shipment records for solid waste disposals of non-compacted and compacted solid waste (non-recoverable) to a licensed waste burial facility between September 2003 and September 2004 provided an acceptable level of information in order to determine radioactive nuclide quantities. Shipping manifests and associated paper work for radioactive waste shipped between September 2003 and September 2004 were complete and met the applicable requirements of Appendix G to 10 CFR 20, and 10 CFR 61.55 and 56. A procedure and program was in place to track waste shipments. The waste shipment tracking log was current including acknowledgment of waste receipt.

b. Conclusion

The radioactive waste shipment tracking system records and waste shipment manifests were complete and accurate. The program for the disposal of low-level radioactive waste was compliant with regulatory requirements.

8. **Low-level Radioactive Waste Storage (IP 84900) (R5)**

a. Inspection Scope and Observations

The low level radioactive waste (LLRW) storage management program was reviewed for adequacy of proper storage area, waste container integrity, and the safe shipment, processing, and disposal of LLRW. The waste tracking system was also reviewed for completeness and adequacy.

The inspectors toured the radioactive material and waste storage areas and observed storage of non-recoverable LLRW in 55 gallon drums for compacted shipment and offsite disposal. The waste containers were labeled properly and no significant container degradation or posting discrepancies were observed. Greater than Class C quantity of material and radioactive waste was adequately identified [redacted]

[redacted]

[redacted]

b. Conclusions

LLRW was stored in accordance with regulatory requirements. Radioactive material and waste greater than Class C quantity was adequately [redacted].

9. **Operator Training (IP 88010)**

a. 10 CFR 19.12 Training (F2.01), General Nuclear Criticality Safety Training (F2.02), and General Radiological Safety Training (F2.03)

(1) Inspection Scope and Observations

The training video for the refresher training on nuclear criticality safety, general employee safety, and radiation worker training provided adequate detail to instruct workers on proper safety techniques. The training instructed workers to stop work and contact supervision when unusual conditions arose and not take shortcuts as they usually result in the reduction (by-pass) of a safety control. The computer system for tracking the annual refresher training ensured that operators maintained current qualifications.

(2) Conclusions

The licensee adequately implemented the nuclear criticality safety, general employee, and radiation worker training programs for the facility.

b. Operator Procedure Training (F2.05), and On-the-job Training (F2.06)

(1) Inspection Scope and Observations

Training records for three operators in the uranium recovery area were reviewed and considered current. Downblending area operators were also properly qualified.

(2) Conclusions

The training system used to maintain qualified operators was effective.

10. **Exit Meeting**

The inspection scope and results were summarized on August 27, and September 9, 2004, with W. Nash, Vice President and General Manager, and other members of the licensee's staff. The results of the Waste Management and Radiation Protection inspections were reviewed with licensee management (S. Schilthelm, L. Morrell) via telephone conference on September 9, 2004. Although proprietary documents and processes were occasionally reviewed during this inspection, the proprietary nature of these documents or processes was deleted from Part 1 of this report. No dissenting comments were received from the licensee.

[redacted]

[redacted]

[redacted]

ATTACHMENT

1. **LIST OF PERSONS CONTACTED**

Licensee

C. Abernathy, Supervisor, Nuclear Material Control
S. Blitchington, Supervisor, Health Physics (LTC)
T. Artman, Industrial Engineering
W. Baker, Supervisor, Nuclear Materials Control
D. Baldwin, Recovery Operations
D. Bryant, Operations
W. Camm, Industrial Health & Safety
C. Carr, Manager, Administration and Security
J. Compher, Manager, Industrial Engineering
B. Davis, Security Specialist
K. Hour, Manager, LTC Nuclear Material Engineering
T. Martin, Manager, Security Operations
S. McElroy, Industrial Health & Safety
L. Morrell, Licensing & Safety Analysis
J. Myrick-Jenkins, Industrial Health & Safety
W. Nash, Vice President and General Manager
H. Nicks, Manager, Security
J. Noel, Manager, NRC Security
S. Peters, Manager, Recovery Operations
P. Thornton, Fire Engineer
S. Schilthelm, Manager, Safety and Licensing
D. Spangler, Manager, Radiation Protection
M. Suwala, Manager, Nuclear Materials Control
D. Ward, Manager, Environment, Safety, Health and Safeguards
G. Ware, Mechanical Maintenance

Other licensee employees contacted included engineers, technicians, production staff, security, and office personnel.

2. **INSPECTION PROCEDURES USED**

TI 2600/006	Resident Inspection Program for Category I Fuel Cycle Facilities
IP 83822	Radiation Protection
IP 84850	Radioactive Waste Generator Requirements
IP 84900	Low-Level Radioactive Waste Storage
IP 88010	Operator Training
IP 88020	Regional Criticality Safety Inspection Program
IP 88035	Waste Management

[redacted]

[redacted]

[redacted]

3. **LIST OF ITEMS OPENED, CLOSED, AND DISCUSSED**

Item Number	Status	Description
70-27/2004-06-01	Opened/Closed	NCV - Failure to Follow Procedure Results in LLD Tray Fire

4. **LIST OF ACRONYMS USED**

ALARA	As Low As Reasonably Achievable
CA	Corrective Action
CFR	Code of Federal Regulations
CMS	Criticality Monitoring System
CEDE	Committed Effective Dose Equivalent
CY	Calendar Year
DDE	Deep Dose Equivalent
EOC	Emergency Operations Center
EPS	Emergency Power System
IP	Inspection Procedure
[redacted]	[redacted]
LLRW	Low-Level Radioactive Waste
LTC	Lynchburg Technology Center
MAA	Materials Access Area
NCS	Nuclear Criticality Safety
NCV	Non-Cited Violation
NPD	Nuclear Products Division
OP	Operating Procedure
P&ID	Process and Instrumentation Diagram
RC	Radiation Control
RP	Radiation Protection
[redacted]	[redacted]
RWP	Radiation Work Permit
SAR	Safety Analysis Report
SDE	Skin Dose to the extremity
SER	Safety Evaluation Request
SNM	Special Nuclear Material
SDE	Skin Dose to the extremity
SDE	Skin Dose to the extremity
TEDE	Total Effective Dose Equivalent
TI	Temporary Instruction
[redacted]	[redacted]
UR	Uranium Recovery

[redacted]